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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,448	10/18/2002	Abhijeet V. Chavan	DP-307129	1350

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EXAMINER

LEBENTRITT, MICHAEL

ART UNIT PAPER NUMBER

2824

DATE MAILED: 01/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/065,448

Applicant(s)

CHAVAN ET AL.

Examiner

Michael S. Lebentritt

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AW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-15 and 17-20 is/are rejected.
- 7) ☒ Claim(s) 7 and 16 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 October 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6,8-15,17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wise et al, US Patent 5,100,479 and further in view of Schieferdecker et al, US Patent 6,294,787.

Wise discloses forming a circuit device on a substrate by processing steps that include forming multiple dielectric layers (40) and at Least one conductive layer (34) on the substrate (50), the multiple dielectric layers comprising an oxide Layer (40) on a surface of the substrate (50) and at Least two dielectric layers that are in tension, the at least one conductive Layer (34) being between the at least two dielectric Layers', and then etching a surface of the substrate to form a cavity (35) therein and thereby delineate the micromachined member (52,44,30,14) and a frame (37) surrounding the micromachined member, the dry etching step terminating at the oxide layer (37), the micromachined member comprising the multiple dielectric layers and the at least one conductive Layer. Please see figures 4a-5 and discussion on column 4, line 40 to column 8, line 34.

Wise is applied supra but lacks the anticipation of wherein dry etching is performed to form said cavity. Schieferdecker discloses forming a cavity for a

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thermopile sensor (10) using Deep Reactive Ion Etching (DRIE). See figure 3a and discussion on column 4, line 60 to column 5, line 44. In view of this disclosure it would have been obvious to one of ordinary skill in the art at the time of invention to form said cavity by dry etching, as taught by Schieferdecker, in view of the primary reference of Wise, because the dry etching produces holes having a depth corresponding to the thickness of the wafer, so that the hot end will be isolated for better sensitivity.

In regards to claims 2,3:

wherein the diaphragm has a first surface for receiving thermal radiation (40) and a sensing Layer that contains at least a pair of interlaced thermopiles, each thermopile comprising a sequence of thermocouples (34), each thermocouple comprising dissimilar electrically-resistive materials that define hot junctions Located on the diaphragm and cold junctions Located on the frame, the at least one conductive Layer defining metal conductors that electrically connect the thermopiles to the circuit device.

In regards to claims 4 and 5:

further comprising the step of forming a metal body (36) so as to be within the diaphragm for reflecting thermal energy through at least one of the multiple dielectric layers toward the hot (cold) junctions of the thermopiles.

In regards to claims 8 and 9;

wherein at least one dielectric Layer of the multiple dielectric Layers is formed of an infrared-absorbing material chosen from the group consisting of an oxynitride or a tetra-ethyl-ortho-silicate based oxide and wherein the at least two dielectric Layers in tension comprise a nitride Layer and an oxynitride Layer. (see column 6, lines 42 to 60).

In regards 11 and 12, Schieferdecker discloses a further step of an additional anisotropic or isotropic etch to complete the cavity. See column 5, line 20 to 45.

In regards to claim 13:

Wise discloses forming the circuit device on the substrate by processing steps that include forming a thermal oxide layer (40) on a surface of the substrate (50), forming a first tensioned dielectric Layer on the thermal oxide Layer, forming a thermal sensing layer (34) over the first tensioned dielectric layer, forming at least a first conductive Layer (36) over the thermal sensing Layer, and then forming a second tensioned dielectric Layer (38) so that the first conductive Layer is between the first and second tensioned dielectric Layers; and then etching a surface of the substrate to form a cavity therein and thereby delineate the diaphragm and a frame surrounding the diaphragm, the dry etching step terminating at the thermal oxide layer, the diaphragm comprising the thermal oxide Layer, the first and second tensioned dielectric Layers, and the first conductive Layer.

Wise is applied supra but lacks the anticipation of wherein dry etching is performed to form said cavity. Schieferdecker discloses forming a cavity for a thermopile sensor (10) using Deep Reactive Ion Etching (DRIE). See figure 3a and discussion on column 4, line 60 to column 5, line 44. In view of this disclosure it would have been obvious to one of ordinary skill in the art at the time of invention to form said cavity by dry etching, as taught by Schieferdecker, in view of the primary reference of Wise, because the dry etching produces holes having a depth corresponding to the thickness of the wafer, so that the hot end will be isolated for better sensitivity.

In regards to claims 14,15, and 17-20, please see above discussion.

Allowable Subject Matter

Claims 7 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: prior art fails to teach wherein the cavity has a rectangular shape with rounded corners.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent 6,631,638 discloses forming a fluid flow sensor, which could be adapted to thermopile technology (see column 3, lines 39 to 50), in which the cavity is etched using dry etching techniques. See figure 10 and 11 and discussion on column 8, line 10 to column 9, line 34.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael S. Lebentritt whose telephone number is 571-272-1873. The examiner can normally be reached on 5/4/9.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on 571-272-1869. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-3431.

A handwritten signature in black ink, appearing to read "Michael S. Lebentritt", with a stylized flourish at the end.

Michael S. Lebentritt
Primary Examiner
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